United States Patent [19]

Sweeney

[11] **4,374,648**

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[54] **MOTOR FUEL COMPOSITION**

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[*] Notice: The portion of the term of this patent subsequent to Nov. 24, 1998, has been disclaimed.

[21] Appl. No.: **291,691**

[22] Filed: **Aug. 10, 1981**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 155,044, May 30, 1980, Pat. No. 4,302,214.

[51] **Int. Cl.**[3] **C10L 1/18**

[52] **U.S. Cl.** **44/56**; 44/53; 44/77

[58] **Field of Search** 44/53, 56, 77

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,897,068	7/1959	Pellegrini et al.	44/56
3,869,262	3/1975	Mayerhoffer et al.	44/56
3,901,664	8/1975	Kozlowski et al.	44/56
3,988,122	10/1976	Rosenthal et al.	44/56
4,252,541	2/1981	Herbstman	44/56

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[57] **ABSTRACT**

Disclosed is a motor fuel comprising a major portion of gasoline-boiling-range compounds and from 0.1 to 49 volume percent di-(t-butoxy)methane.

6 Claims, No Drawings

MOTOR FUEL COMPOSITION

CROSS-REFERENCE TO RELATED APPLICATIONS

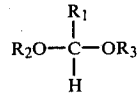
This application is a continuation-in-part of Ser. No. 155,044, filed May 30, 1980, now U.S. Pat. No. 4,302,214 the entire disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

The present invention relates to a motor fuel composition comprising gasoline-boiling-range compounds and di-(t-butoxy)methane.

The use of oxygen-containing compounds in gasoline is known in the art. See, for example, U.S. Pat. Nos. 2,897,068; 3,901,664; 3,988,122 and 3,869,262.

U.S. Pat. No. 3,869,262 discloses gasoline compositions preferably containing at least three oxygen-containing compounds. Claimed are gasoline compositions containing diether compounds of the general formula:



wherein R_1 is H or CH_3 and R_2 and R_3 are each CH_3, C_2H_5, C_3H_7 or C_4H_9. Preferred are the lower molecular weight compounds which contain one or more methyl groups. The largest formal exemplified is diethylformal containing only 5 carbon atoms.

U.S. Pat. Nos. 3,594,136; 3,270,497 and 2,184,956 all disclose glycol ethers, such as the di-t-butyl ether of ethylene glycol, as blending agents for hydrocarbon fuels.

SUMMARY OF THE INVENTION

A motor fuel comprising a major portion of gasoline boiling-range compounds and from 0.1 to 49 volume percent di-(t-butoxy) methane.

DETAILED DESCRIPTION OF THE INVENTION

The invention resides in a motor fuel comprising a major portion of gasoline-boiling-range compounds and 0.1 to 49 volume percent di-(t-butoxy)methane. The fuel will generally comprise 51 to 99.9 volume percent gasoline-boiling-range compounds (other than di-(t-butoxy)methane) and 0.1 to 49 volume percent di-(t-butoxy)methane. Preferably, the fuel will comprise 70 to 99.8 volume percent di-(t-butoxy)methane. Still more preferably, the fuel will comprise 90 to 99.8 volume percent gasoline-boiling-range compounds and 0.2 to 10 volume percent di-(t-butoxy)methane.

Gasoline-boiling-range compounds suitable for use in motor fuels are well known in the art and usually boil between about the boiling point of butane and 430° F. Generally, these compounds will comprise hydrocarbons derived from refined crude oil. However, oxygenated compounds can also be used, such as methanol, ethanol, methyl-t-butyl ether, etc.

Methods of making di-(t-butoxy)methane are known in the art. One method of making di-(t-butoxy)methane is from the reaction of t-butyl alcohol and formaldehyde

in the presence of an acid catalyst such as p-toluene sulfonic acid.

A motor fuel consisting of 92 volume percent of a lead-free standard gasoline having a research octane number of 95.1 and a motor octane number of 85.9 and 8 volume percent of various diethers were tested under standard test conditions (ASTM D-2699 and D-2700) to determine their research and motor octane numbers. The blending octane number (ON) is calculated as follows:

$$\text{Blending } ON = \frac{100\ (\text{measured } ON \text{ of blend} - ON \text{ of base fuel})}{\text{percent substance in blend}} + ON \text{ of base fuel}$$

The fuels were also tested for corrosion potential using ASTM D-665 (using 5 hours and tap water). The results are shown in Table I below.

TABLE I

Ether Additive	Blendingg Research Octane No.	Blending Motor Octane No.	Percent Rust
None (base fuel)	95.1	85.9	<5
di-sec-butoxymethane	70	78	35
di-iso-butoxymethane	54	61	20
di-isopropoxymethane	86	77	50
di-n-butoxymethane	5	11	100
di-ethoxymethane	59	52	90
di-(t-butoxy)methane	113	104	<5

The above octane data indicates that di-(t-butoxy)methane produces unexpectedly high blending research and motor octane numbers. This is particularly surprising in view of the fact that all of the other ether compounds tested decrease the octane number from the value of the base fuel. It is also surprising in view of the teaching of U.S. Pat. No. 3,869,262 which teaches that the lower molecular weight diethers are preferred.

The above rust data indicates that di-(t-butoxy)methane is unexpectedly superior to the other formal compounds in not promoting corrosion.

What is claimed is:

1. A gasoline major fuel comprising a major portion of gasoline-boiling-range compounds and from 0.1 to 49 volume percent di-(t-butoxy)methane.

2. The motor fuel of claim **1** wherein 0.2 to 10 volume percent is di-(t-butoxy)methane.

3. The motor fuel of claim **1** wherein 51 to 99.9 volume percent of said fuel comprises gasoline-boiling-range compounds.

4. The motor fuel of claim **1** wherein 51 to 99.9 volume percent of said compounds comprises gasoline-boiling-range hydrocarbons.

5. The motor fuel of claim **1** wherein 70 to 99.8 volume percent of said compounds comprises gasoline-boiling-range hydrocarbons and 0.2 to 10 volume percent is di-(t-butoxy)methane.

6. The motor fuel of claim **1** wherein 90 to 99.8 volume percent of said compounds comprises gasoline-boiling-range hydrocarbons and 0.2 to 10 volume percent is di-(t-butoxy)methane.

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